Small Business Innovation Research/Small Business Tech Transfer

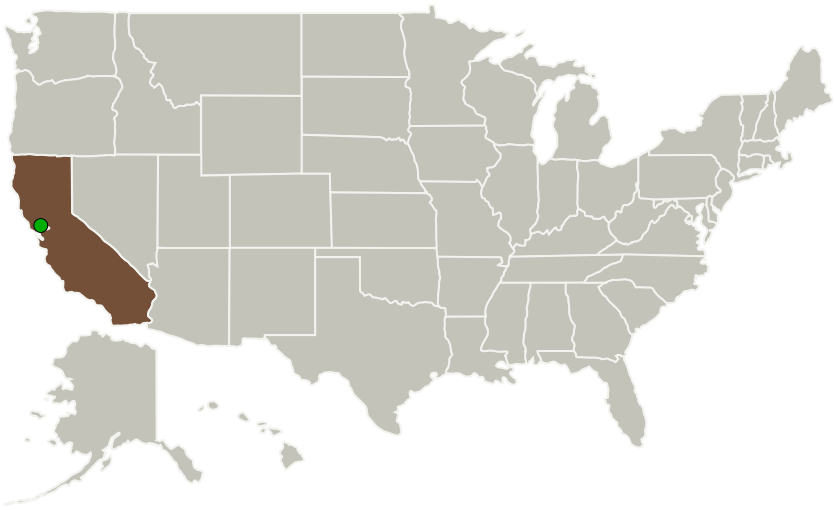
Embedded Multifunctional Optical Sensor System, Phase I

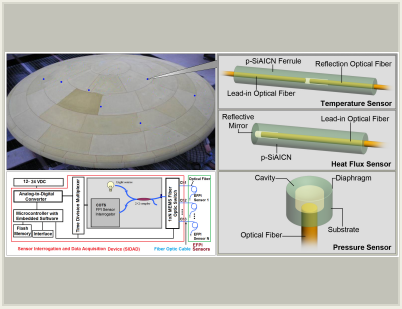
Completed Technology Project (2015 - 2015)

Project Introduction

To address NASA's need for in situ sensor systems for use on rigid and/or flexible ablative Thermal Protection System (TPS) materials, Physical Optics Corporation (POC) proposes to develop a novel Embedded Multifunctional Optical Sensor (EMOS) system providing accurate in situ measurement of multiple thermal protection system (TPS) structural, aerothermal, and aerodynamic response parameters including temperature, heat flux, and pressure. The EMOS is based on use of novel materials for high-temperature operation and uniquely designed fiber optic microsensors. The EMOS system is capable of simultaneously measuring multiple TPS response parameters (e.g., pressure, temperature, and heat flux) using a suite of miniature (diameter <400 micron) fiber optic Fabry-Perot (FP) interferometric sensors. EMOS will tolerate operating temperatures >1500 degrees C and measurement errors within 0.4% for temperature sensors, 0.2% for pressure sensors, and 20% for heat flux measurement. In Phase I POC will demonstrate the feasibility of EMOS for in-situ measurement of TPS responses in an aerothermal environment by fabricating and testing a technology readiness level (TRL)-4 prototype, with the goal of achieving TRL-6 by the end of Phase II.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Physical Optics Corporation	Lead Organization	Industry	Torrance, California
Ames Research Center(ARC)	Supporting Organization	NASA Center	Moffett Field, California

Primary U.S. Work Locations
California

Project Transitions

June 2015: Project Start

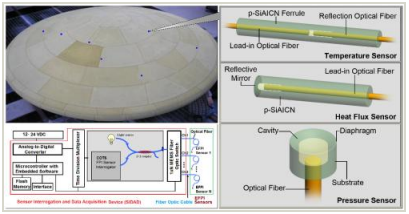
December 2015: Closed out

Closeout Summary: Embedded Multifunctional Optical Sensor System, Phase I Project Image

Closeout Documentation:

- Final Summary Chart Image*(https://techport.nasa.gov/file/138834)*

Images



Briefing Chart Image
Embedded Multifunctional Optical Sensor System, Phase I
(https://techport.nasa.gov/image/129484)

Organizational Responsibility

Responsible Mission Directorate:
Space Technology Mission Directorate (STMD)

Lead Organization:
Physical Optics Corporation

Responsible Program:
Small Business Innovation Research/Small Business Tech Transfer

Project Management

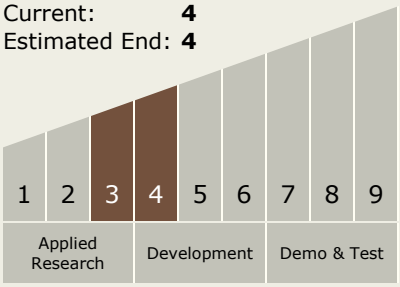
Program Director:
Jason L Kessler

Program Manager:
Carlos Torrez

Principal Investigator:
Naibing Ma

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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Technology Areas

Primary:

- TX09 Entry, Descent, and Landing
  - TX09.4 Vehicle Systems
    - TX09.4.6 Instrumentation and Health Monitoring for EDL

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System